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**D E C I S I O N**  
**of 27 April 2002**

**Case Number:** T 0447/98 - 3.2.5

**Application Number:** 90910175.0

**Publication Number:** 0434846

**IPC:** B29C 70/18

**Language of the proceedings:** EN

**Title of invention:**

Stampable sheet made of fiber-reinforced thermoplastic resin  
and molded article thereof

**Patentee:**

Japan GMT Co., Ltd.

**Opponent:**

BASF Aktiengesellschaft Patente, Marken und Lizenzen

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 54, 56

**Keyword:**

"Novelty (yes)"  
"Inventive step (yes)"

**Decisions cited:**

-

**Catchword:**

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**Case Number:** T 0447/98 - 3.2.5

**D E C I S I O N**  
**of the Technical Board of Appeal 3.2.5**  
**of 27 April 2002**

**Appellant:** Japan GMT Co., Ltd.  
(Proprietor of the patent) 2, Chitose-cho  
Yokkaichi-shi  
MIE 510-0051 (JP)

**Representative:** Gille Hrabal Struck Neidlein Prop Roos  
Patentanwälte  
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D-40593 Düsseldorf (DE)

**Respondent:** BASF Aktiengesellschaft  
(Opponent) Patente, Marken und Lizenzen  
D-67056 Ludwigshafen (DE)

**Representative:** -

**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 27 February 1998  
revoking European patent No. 0 434 846 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** W. Moser  
**Members:** P. E. Michel  
W. Widmeier

## Summary of Facts and Submissions

- I. The appellant (patentee) lodged an appeal against the decision of the Opposition Division revoking patent No. 0 434 846.

Opposition had been filed against the patent as a whole based on Article 100(a) EPC (lack of novelty and inventive step).

The Opposition Division held that the subject-matter of claims 1 and 2 of the sole request of the appellant for maintenance of the patent as granted was not novel.

- II. The appellant requests that the decision under appeal be set aside and the patent be maintained on the basis of claims 1 and 2 of a sole request filed as first auxiliary request on 1 December 2000.

The respondent (opponent) withdrew the opposition on 8 August 2000 and withdrew the request for oral proceedings on 3 November 2000.

- III. The following documents have been referred to in the appeal proceedings:

D1: US-A-4 749 613

D2: DE-A-35 35 272

- IV. The claims of the sole request of the appellant read as follows:

"1. A stampable sheet made of fiber-reinforced thermoplastic resin, wherein a glass fiber mat (12) is

impregnated with a resin, said glass fiber mat (12) being formed with

(a) a non-oriented fiber layer (3) composed of glass long-fiber bundles (x) so arranged as to have no directional property and

(b) a unidirectional fiber layer (8) composed of glass long-fiber bundles (y) so arranged as to have a directional property in a predetermined direction,

(c) said resin with which the glass fiber mat (12) is impregnated is a thermoplastic resin,

(d) said glass fiber mat (12) is formed by mechanically intertwining the non-oriented fiber layer (3) and the unidirectional fiber layer (8),

(e) a content of said glass fiber mat (12) in the stampable sheet made of the fiber-reinforced thermoplastic resin is 20 wt% to 55 wt%,

(f) a content of the glass long-fiber bundles (y) forming said unidirectional fiber layer (8) in said glass fiber mat (12) is 20 wt% to 80 wt%, characterized in that

(g) the length of 50% to 100% of glass long-fiber bundles of the glass long-fiber bundles (y) forming said unidirectional fiber layer (8), as viewed in plane, is 1.005 to 1.10 times length, in the orientation direction, of the glass long-fiber bundles (y) forming the unidirectional fiber layer (8) in said stampable sheet or

(g') the length of 40% to 100% of glass long-fibers of the glass long-fiber bundles (y) forming said unidirectional fiber layer (8) is 1.005 to 1.10 times length, in the orientation direction, of the glass long-fiber bundles (y) forming the unidirectional fiber layer (8) in said stampable sheet.

2. A molded article characterized in that a single or

laminated stampable sheet(s) made of the fiber-reinforced thermoplastic resin according to claim 1 is press-molded."

V. The appellant argues essentially as follows:

Document D2 does not disclose features (g) and (g') of claim 1. The subject-matter of claim 1 is thus novel.

The closest prior art is represented by document D2. The effects of features (g) and (g') and the problems which are overcome are set out in the patent in suit. In particular, the prior art does not suggest that an improvement in moulding flowability and an increase in compressive strength in the reinforcing direction can be obtained by virtue of the adoption of features (g) and (g'). The subject-matter of claim 1 thus involves an inventive step.

VI. The respondent argues essentially as follows:

The subject-matter of claim 1 lacks novelty in view of the disclosure of document D2. When following the procedure of Example 2 of document D2, a stampable sheet having all the features of claim 1 will be produced.

According to the experimental report of Mr. Maeda, in which the procedure of Example 2 of document D2 is followed, 25% of the glass fibre bundles of the unidirectional fiber layer have a length of from 1.005 to 1.10 times the length, in the orientation direction, of the glass long-fiber bundles forming the unidirectional fiber layer. The method of measuring the length of the glass long-fiber bundles as set out in

the patent in suit at page 7, lines 29 to 36 and 45 to 55, could result in errors of 20%, thus resulting in 55% of the fibre bundles having the required length.

Whilst following the teaching of Example 2 of document D2 involves a comparatively strong degree of needling, thus resulting in a high degree of disorientation of the fibre bundles, a lesser degree of needling or less vibration of the needling machine also falls within the teaching of document D2. The person skilled in the art would be able to arrive at an optimal needling intensity or an optimum amount of vibration during needling by routine experimentation.

In the examples of document D1, contrary to the teaching of the patent in suit, the non-oriented fiber layer is laid on the unidirectional fiber layer. Thus, the unidirectional fiber layer is in contact with a conveyor belt and is thus not under tension. A stampable sheet having feature (g) of claim 1 will thus be produced.

The subject-matter of claim 1 thus lacks an inventive step.

## **Reasons for the Decision**

### **1. *Amendments***

Claim 1 according to the sole request of the appellant has been amended as compared with claim 1 of the patent in suit as granted in that features (g) and (g') (features e) and e') of claim 1 as granted) now read as follows (emphasis added):

"(g) the length of **50%** to 100% of glass long-fiber bundles of the glass long-fiber bundles (y) forming said unidirectional fiber layer (8), as viewed in plane, is 1.005 to 1.10 times length, in the orientation direction, of the glass long-fiber bundles (y) forming the unidirectional fiber layer (8) in said stampable sheet or  
(g') the length of **40%** to 100% of glass long-fibers of the glass long-fiber bundles (y) forming said unidirectional fiber layer (8) is 1.005 to 1.10 times length, in the orientation direction, of the glass long-fiber bundles (y) forming the unidirectional fiber layer (8) in said stampable sheet."

Referring to the printed version of the application as filed, these features are disclosed at page 5, line 30, and page 5, line 57. In addition, the replacement of the figure of 15% by 50% in feature (g) and the replacement of the figure of 35% by 40% in feature (g') represents a restriction of the protection conferred.

The amendments thus comply with the requirements of Articles 123(2) and (3) EPC. In addition, the amendments were made in order to overcome objections of lack of novelty and inventive step and thus are occasioned by grounds of opposition specified in Article 100 EPC. They thus also comply with the requirements of Rule 57a EPC.

## 2. *Novelty*

According to Example 2 of document D2, glass long-fibre bundles (glass rovings) having a fineness of 2400 tex are laid ("aufgelegt") on a glass fibre mat formed of endless fibres having a weight per unit area of

300 g/m<sup>2</sup>. This material is passed through a needling machine operating at 50 stitches per cm<sup>2</sup> at a depth of 16 mm.

According to the experimental report of Mr Maeda, a stampable sheet was produced in accordance with Example 2 of document D2. In Experiment I, the sheet was tested for compliance with feature g) of claim 1, the results being shown in Table A. This shows that Bundles Nos. 3, 9, 14, 16 and 20 fall within the range of 1.005 to 1.10 times length as specified in feature g); that is, five out of twenty bundles, or 25% of the bundles, satisfy this criterion.

The subject-matter of claim 1 is thus novel, since feature g) requires that at least 50% of the bundles forming the unidirectional fiber layer should satisfy the requirement that, as viewed in plane, their length is 1.005 to 1.10 times the length, in the orientation direction, of the glass long-fiber bundles forming the unidirectional fiber layer in the stampable sheet.

It was suggested on behalf of the respondent that, owing to preparatory steps carried out prior to measuring the length of the glass long-fiber bundles as set out in the patent in suit at page 7, lines 29 to 36 and 45 to 55, the method of measuring could result in errors of 20%, thus resulting in 55% of the fibre bundles having the required length. There is, however, no evidence to support this allegation.

Claim 2 is directed to a moulded article formed by press moulding one or more stampable sheets according to claim 1. The subject-matter of the claim is thus novel for the same reasons as given for claim 1.



3. *Inventive step*

3.1 Closest prior art

Document D2, and more particularly, Example 2 thereof, represents the closest prior art and discloses a stampable sheet having all the features of the precharacterising portion of claim 1.

3.2 Object of the invention

The object of the invention is to improve the moulding flowability in the reinforcing direction (patent in suit, page 3, lines 40 and 41).

3.3 Solution

According to claim 1, the above object is achieved by the features of either feature (g) or (g') of claim 1.

The prior art does not disclose a sheet satisfying these parameters. Moreover, there is nothing in the prior art which would tend to induce the person skilled in the art to vary the manufacturing conditions as disclosed in document D2 so as to result in a sheet satisfying these parameters.

It was suggested on behalf of the respondent that, whilst following the teaching of Example 2 of document D2 involves a comparatively strong degree of needling, thus resulting in a high degree of disorientation of the fibre bundles, a lesser degree of needling or less vibration of the needling machine falls within the teaching of document D2. The person skilled in the art

would be able to arrive at an optimal needling intensity or an optimum amount of vibration through routine experimentation. However, in the absence of any suggestion in the prior art that needling intensity or the amount of vibration in the needling machine should be varied in order to produce a stampable sheet in which the length of the fibre bundles satisfies the criterion of feature (g) of claim 1, this argument must be regarded as involving ex post facto analysis.

Whilst the unidirectional fibre bundles of the Examples of document D1 are not maintained under tension, this is not sufficient to ensure that the bundles satisfy condition (g). As discussed above, the bundle lengths in the stampable sheet depend also on the needle punch conditions. There is thus no suggestion in document D1 that the unidirectional fibre bundles should satisfy the criterion of feature (g) of claim 1.

Whilst claim 1 specifies an alternative condition (g'), which specifies the length of the individual glass long-fibers of the glass long-fiber bundles as opposed to the length of the glass long-fiber bundles themselves, the arguments of the respondent did not address this alternative.

4. The subject-matter of claim 1 thus involves an inventive step. Claim 2 is directed to a moulded article formed by press moulding the sheet of claim 1. This claim thus similarly involves an inventive step.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of the following documents:
  - (a) claims 1 and 2 filed on 1 December 2000 as first auxiliary request;
  - (b) description: pages 2 and 6 to 12 and page 13, lines 1 to 53, as granted; page 3, including the insertion at lines 18 to 38, and pages 4 and 5 as filed on 25 October 2001;
  - (c) drawings as granted.

The Registrar:

The Chairman:

N. Maslin

W. Moser